Title 33

ENVIRONMENTAL QUALITY

Part V. Hazardous Waste and Hazardous Materials

Subpart 1. Department of Environmental Quality—Hazardous Waste

Chapter 1. General Provisions and Definitions

§105. Program Scope

These rules and regulations apply to owners and operators of all facilities that generate, transport, treat, store, or dispose of hazardous waste, except as specifically provided otherwise herein. The procedures of these regulations also apply to the denial of a permit for the active life of a hazardous waste management facility or TSD unit under LAC 33:V.706. Definitions appropriate to these rules and regulations, including *solid waste* and *hazardous waste*, appear in LAC 33:V.109. Wastes that are excluded from regulation are found in this Section.

A. - O.2.c.vi. …

P. Criteria for Hazardous Waste Being Managed Within an Area of Contamination. An area of contamination (AOC) is a discrete area of generally dispersed contamination, the designation of which has been approved by the administrative authority. Under certain conditions, environmental media impacted with hazardous waste may be moved within an AOC without triggering land disposal restrictions or minimum technology requirements. This approach encourages and expedites remedial actions where hazardous waste releases have occurred.

1. Any person who proposes to manage contaminated media within an AOC must submit the definition of the project's AOC to the Office of Environmental Assessment. Approval from the administrative authority concerning the extent of the AOC must occur prior to movement of contaminated media. In general the AOC should be consistent with the area impacted by the release

2. Use of an AOC to manage hazardous waste may be appropriate where the additional flexibility of a corrective action management unit pursuant to LAC 33:V.Chapter 26 is not needed. Movement and consolidation of contaminated media, treating contaminated media *in situ*, or leaving contaminated media in place in a single area or engineered unit within an AOC will not trigger the hazardous waste land disposal restrictions or minimum technology requirements of LAC 33:V.Subpart 1.

AUTHORITY NOTE: Promulgated in accordance with R.S. 30:2180 et seq., and in particular, 2186(A)(2).

HISTORICAL NOTE: Promulgated by the Department of Environmental Quality, Office of Solid and Hazardous Waste, Hazardous Waste Division, LR 10:200 (March 1984), amended LR 10:496 (July 1984), LR 11:1139 (December 1985), LR 12:319 (May 1986), LR 13:84 (February 1987), LR 13:433 (August 1987), LR 13:651 (November 1987), LR 14:790 (November 1988), LR 15:181 (March 1989), LR 16:47 (January 1990), LR 16:217, LR 16:220 (March 1990), LR 16:398 (May 1990), LR 16:614 (July 1990), LR 17:362, 368 (April 1991), LR 17:478 (May 1991), LR 17:883 (September 1991), LR 18:723 (July 1992), LR 18:1256 (November 1992), LR 18:1375 (December 1992), amended by the Office of the Secretary, LR 19:1022 (August 1993), amended by the Office of Solid and Hazardous Waste, Hazardous Waste

Division, LR 20:1000 (September 1994), LR 21:266 (March 1995), LR 21:944 (September 1995), LR 22:813, 831 (September 1996), amended by the Office of the Secretary, LR 23:298 (March 1997), amended by the Office of Solid and Hazardous Waste, Hazardous Waste Division, LR 23:564, 567 (May 1997), LR 23:721 (June 1997), amended by the Office of Waste Services, Hazardous Waste Division, LR 23:952 (August 1997), LR 23:1511 (November 1997), LR 24:298 (February 1998), LR 24:655 (April 1998), LR 24:1093 (June 1998), LR 24:1687, 1759 (September 1998), LR 25:431 (March 1999), amended by the Office of Environmental Assessment, Environmental Planning Division, LR 26:268 (February 2000), LR 26:2464 (November 2000), LR 27:291 (March 2001), LR 27:706 (May 2001), LR 29:317 (March 2003), LR 30:1680 (August 2004), amended by the Office of Environmental Assessment, LR 30:2463 (November 2004), amended by the Office of the Secretary, Legal Affairs Division , LR 31:2451 (October 2005), LR 32:605 (April 2006), LR 32:821 (May 2006), LR 33: **.

§106. Hazardous Waste Determination for Contaminated Media

A. Except as otherwise provided in this Section, environmental media that contain hazardous waste subject to regulation under LAC 33:V.4901 or LAC 33:V.4903, shall be managed as hazardous waste. An environmental medium (soil/sediment, surface water, or groundwater) no longer contains a hazardous waste when:

1. the concentration of the hazardous constituent that serves as the basis for the waste being listed as hazardous (as defined in LAC 33:V.109 or as determined by the department on a case-by-case basis, e.g., creosote) remaining in the medium meets the appropriate standards described in this Section; and

2. the medium no longer exhibits any of the characteristics of hazardous waste identified in LAC 33:V.4903. Land disposal treatment standards (LAC 33:V.2299) shall continue to apply to contaminated environmental media that are treated and then determined to no longer contain hazardous waste. Contaminated environmental media determined not to contain any hazardous waste prior to treatment are not subject to any RCRA Subtitle C requirement, including the standards in LAC 33:V.2299.

B. Nonhazardous Environmental Medium (NHEM) Determination

1. Upon written request, the department may make a site-specific determination that an environmental medium contaminated with a listed hazardous waste at a concentration of the hazardous constituent at or below the level described in this Section no longer contains hazardous waste. Such a determination shall be known as a NHEM determination. A site-specific NHEM determination may be granted by the department contingent upon management of the environmental medium in accordance with any institutional control or other requirement described in the letter granting the request.

2. When a NHEM determination would be useful to expedite site remediation, a written request and payment of the fee in accordance with LAC 33:V.5147 may be submitted to the Office of Environmental Assessment. The request must demonstrate application of the process described in Paragraphs B.3-4 of this Section and that land disposal treatment standards are met when applicable.

3. A NHEM determination does not authorize the placement of contaminated media in, or establish remedial standards for, a particular area. Approval for placement of the contaminated medium in a specific area must be obtained from the Office of Environmental Assessment, unless it is otherwise allowed by regulation. Remedial standards for areas of

contamination shall be established in accordance with the Risk Evaluation/Corrective Action Program (RECAP) as incorporated by reference in LAC 33:I.1307.

4. The identification, development, and application of the standards for media to be determined to no longer contain hazardous waste shall comply with the following process.

a. Determine the area of investigation (AOI). The AOI is a zone contiguous to and including impacted media, defined vertically and horizontally by the presence of one or more constituents in concentrations exceeding a limiting standard.

b. Identify the area of investigation concentration (AOIC). The AOIC is to be identified by the maximum detected concentration of the constituent of concern (COC) in the AOI or the upper bound estimate (e.g. upper confidence limit) of the arithmetic mean concentration of the COC.

Note: The department recommends that the upper bound estimate of the arithmetic mean concentration be identified as the concentration recommended by the *ProUCL* program, a software program available from EPA's Technical Support Center for Monitoring and Site Characterization (www.epa.gov/nerlesd1/tsc/form.htm).

c. Determine the soil standard ($Soil_{NHEM}$). The soil standards are presented in Table 1 of this Section. For a constituent not included in Table 1, the applicant shall calculate a value using the appropriate equation and input values from LAC 33:V.199.Appendix A. Compare the soil standard to the AOIC. If the AOIC detected for a COC does not exceed the soil standard, then a NHEM determination may be made.

d. Identify the groundwater exposure concentration (EC). The EC shall be identified as the maximum concentration of COC detected in the groundwater AOI.

e. Determine the groundwater standard (GW_{NHEM}). The groundwater standards are presented in Table 1 of this Section. If a detected groundwater constituent cannot be found in Table 1, then the maximum contaminant level (MCL), contained in the National Primary Drinking Water regulations (40 CFR Part 141), multiplied by 100 is to be used as the groundwater standard. If an MCL is not available then a groundwater standard is to be calculated in accordance with appropriate equations and input values from LAC 33:V.199.Appendix A. Compare the groundwater EC to the groundwater standard. If quantitative values for constituents are less than the limiting standards, the groundwater may qualify for a NHEM determination.

Table 1

Soil and Groundwater Standards

Compound	CAS #	$Soil_{NHEM}$ (mg/kg)	GW_{NHEM} (mg/l)
Acenaphthene	83-32-9	6.1E+05	3.7E+02
Acenaphthylene	208-96-8	5.1E+05	3.7E+02
Acetone	67-64-1	1.4E+05	6.1E+02
Aldrin	309-00-2	1.3E+00	3.9E-03
Aniline	62-53-3	1.7E+03	1.2E+01
Anthracene	120-12-7	1.0E+06	1.8E+03
Antimony	7440-36-0	8.2E+03	6.0E-01
Arsenic	7440-38-2	2.7E+01	1.0E+00
Barium	7440-39-3	1.0E+06	2.0E+02

Table 1 Soil and Groundwater Standards			
Compound	CAS #	$Soil_{NHEM}$ (mg/kg)	GW_{NHEM} (mg/l)
Benzene	71-43-2	3.1E+01	5.0E-01
Benz(a)anthracene	56-55-3	2.9E+01	9.1E-02
Benzo(a)pyrene	50-32-8	2.9E+00	2.0E-02
Benzo(b)fluoranthene	205-99-2	2.9E+01	9.1E-02
Benzo(k)fluoranthene	207-08-9	2.9E+02	9.1E-01
Beryllium	7440-41-7	4.1E+04	4.0E-01
Biphenyl,1,1-	92-52-4	4.4E+05	3.0E+02
Bis(2-chloroethyl)ether	111-44-4	1.1E+01	9.6E-03
Bis(2-chloroisopropyl)ether	108-60-1	1.7E+02	2.7E-01
Bis(2-ethyl-hexyl)phthalate	117-81-7	1.7E+03	6.0E-01
Bromodichloromethane	75-27-4	4.2E+01	1.0E+01
Bromoform	75-25-2	1.8E+03	1.0E+01
Bromomethane	74-83-9	3.0E+02	8.7E+00
Butyl benzyl phthalate	85-68-7	1.0E+06	7.3E+03
Cadmium	7440-43-9	1.0E+04	5.0E-01
Carbon Disulfide	75-15-0	2.5E+04	1.0E+03
Carbon Tetrachloride	56-23-5	1.1E+01	5.0E-01
Chlordane	57-74-9	1.0E+02	2.0E-01
Chloroaniline,p-	106-47-8	1.7E+04	1.5E+02
Chlorobenzene	108-90-7	1.2E+04	1.0E+01
Chlorodibromomethane	124-48-1	5.4E+01	1.0E+01
Chloroethane (Ethylchloride)	75-00-3	8.2E+01	3.8E+00
Chloroform	67-66-3	1.2E+01	1.0E+01
Chloromethane	74-87-3	7.3E+01	1.5E+00
Chloronaphthalene,2-	91-58-7	8.3E+05	4.9E+02
Chlorophenol,2-	95-57-8	1.4E+04	3.0E+01
Chromium(III)	16065-83-1	1.0E+06	1.0E+01
Chromium(VI)	18540-29-97	6.1E+04	1.0E+01
Chrysene	218-01-9	2.9E+03	9.1E+00
Cobalt	7440-48-4	1.0E+06	2.2E+03
Copper	7440-50-8	8.2E+05	1.3E+02
Cyanide (free)	57-12-5	3.6E+05	2.0E+01
DDD	72-54-8	1.6E+02	2.8E-01
DDE	72-55-9	1.1E+02	2.0E-01
DDT	50-29-3	1.2E+02	2.0E-01
Dibenz(a,h)anthracene	53-70-3	2.9E+00	9.1E-03
Dibenzofuran	132-64-9	6.5E+04	2.4E+01
Dibromo-3-chloropropane,1,2-	96-12-8	1.8E+01	2.0E-02
Dichlorobenzene,1,2-	95-50-1	7.4E+04	6.0E+01
Dichlorobenzene,1,3-	541-73-1	1.8E+03	5.5E+00
Dichlorobenzene,1,4-	106-46-7	1.6E+02	7.5E+00

Table 1 Soil and Groundwater Standards			
Compound	CAS #	$Soil_{NHEM}$ (mg/kg)	GW_{NHEM} (mg/l)
Dichlorobenzidine,3,3-	91-94-1	4.2E+01	1.5E-01
Dichloroethane,1,1-	75-34-3	4.7E+04	8.1E+02
Dichloroethane,1,2-	107-06-2	1.8E+01	5.0E-01
Dichloroethene,1,1-	75-35-4	9.1E+03	7.0E-01
Dichloroethene,cis,1,2-	156-59-2	3.4E+03	7.0E+00
Dichloroethene,trans,1,2-	156-60-5	4.8E+03	1.0E+01
Dichlorophenol,2,4-	120-83-2	2.0E+04	1.1E+02
Dichloropropane,1,2-	78-87-5	1.8E+01	5.0E-01
Dichloropropene,1,3-	542-75-6	1.0E+02	3.9E-01
Dieldrin	60-57-1	1.5E+00	4.1E-03
Diethylphthalate	84-66-2	1.0E+06	2.9E+04
Dimethylphenol,2,4-	105-67-9	1.1E+05	7.3E+02
Dimethylphthalate	131-11-3	1.0E+06	3.7E+05
Di-n-octylphthalate	117-84-0	3.5E+05	1.5E+03
Dinitrobenzene,1,3-	99-65-0	5.0E+02	3.7E+00
Dinitrophenol,2,4-	51-28-5	6.9E+03	7.3E+01
Dinitrotoluene,2,6-	606-20-2	4.6E+03	3.7E+01
Dinitrotoluene,2,4-	121-14-2	9.8E+03	7.3E+01
Dinoseb	88-85-7	5.4E+03	7.0E-01
Endosulfan	115-29-7	4.5E+04	2.2E+02
Endrin	72-20-8	2.5E+03	2.0E-01
Ethyl benzene	100-41-4	1.3E+05	7.0E+01
Fluoranthene	206-44-0	2.9E+05	1.5E+03
Fluorene	86-73-7	5.4E+05	2.4E+02
Heptachlor	76-44-8	3.5E-01	4.0E-02
Heptachlor epoxide	1024-57-3	2.6E+00	2.0E-02
Hexachlorobenzene	118-74-1	2.0E+01	1.0E-01
Hexachlorobutadiene	87-68-3	1.6E+02	8.5E-01
Hexachlorocyclohexane,alpha	319-84-6	4.4E+00	1.1E-02
Hexachlorocyclohexane,beta	319-85-7	1.6E+01	3.7E-02
Hexachlorocyclohexane,gamma	58-89-9	2.0E+01	2.0E-02
Hexachlorocyclopentadiene	77-47-4	9.4E+02	5.0E+00
Hexachloroethane	67-72-1	1.4E+03	7.9E-01
Indeno(1,2,3-cd)pyrene	193-39-5	2.9E+01	9.1E-02
Isobutyl alcohol	78-83-1	6.2E+05	1.1E+04
Isophorone	78-59-1	1.1E+04	7.0E+01
Lead (inorganic)	7439-92-1	3.4E+04	1.5E+00
Mercury (inorganic)	7487-94-7	6.1E+03	2.0E-01
Methoxychlor	72-43-5	4.3E+04	4.0E+00
Methylene chloride	75-09-2	4.4E+02	5.0E-01
Methyl ethyl ketone	78-93-3	4.4E+05	1.9E+03

Table 1 Soil and Groundwater Standards			
Compound	CAS #	$Soil_{NHEM}$ (mg/kg)	GW_{NHEM} (mg/l)
Methyl isobutyl ketone	108-10-1	6.3E+05	2.0E+03
Methylnaphthalene,2-	91-57-6	1.7E+04	6.2E+00
MTBE (methyl tert-butyl ether)	1634-04-4	4.7E+05	2.0E+00
Naphthalene	91-20-3	4.3E+03	6.2E+00
Nickel	7440-02-0	4.1E+05	7.3E+02
Nitrate	14797-55-8	1.0E+06	1.0E+03
Nitrite	14797-65-0	1.0E+06	1.0E+02
Nitroaniline,2-	88-74-4	5.2E+01	2.1E-01
Nitroaniline,3-	99-09-2	1.4E+04	1.8E+01
Nitroaniline,4-	100-01-6	1.0E+04	1.1E+02
Nitrobenzene	98-95-3	2.5E+03	3.4E+00
Nitrophenol,4-	100-02-7	3.3E+04	2.9E+02
Nitrosodi-n-propylamine,n-	621-64-7	1.4E+00	9.5E-03
N-nitrosodiphenylamine	86-30-6	4.0E+03	1.4E+01
Pentachlorophenol	87-86-5	9.7E+01	1.0E-01
Phenanthrene	85-01-8	1.0E+06	1.8E+03
Phenol	108-95-2	1.0E+06	1.8E+03
Polychlorinated biphenyls	1336-36-3	9.0E+00	5.0E-02
Pyrene	129-00-0	5.6E+05	1.8E+02
Selenium	7782-49-2	1.0E+05	5.0E+00
Silver	7440-22-4	1.0E+05	1.8E+02
Styrene	100-42-5	4.3E+05	1.0E+01
Tetrachlorobenzene,1,2,4,5-	95-94-3	1.2E+03	1.1E+01
Tetrachloroethane,1,1,1,2-	630-20-6	5.9E+01	4.3E-01
Tetrachloroethane,1,1,2,2-	79-34-5	2.0E+01	5.5E-02
Tetrachloroethylene	127-18-4	3.5E+02	5.0E-01
Tetrachlorophenol,2,3,4,6-	58-90-2	1.7E+05	1.1E+03
Thallium	7440-28-0	1.4E+03	2.0E-01
Toluene	108-88-3	4.7E+04	1.0E+02
Toxaphene	8001-35-2	2.2E+01	3.0E-01
Trichlorobenzene,1,2,4-	120-82-1	1.2E+05	7.0E+00
Trichloroethane,1,1,1-	71-55-6	7.0E+04	2.0E+01
Trichloroethane,1,1,2-	79-00-5	4.3E+01	5.0E-01
Trichloroethene	79-01-6	2.1E+00	5.0E-01
Trichlorofluoromethane	75-69-4	2.6E+04	1.3E+03
Trichlorophenol,2,4,5-	95-95-4	6.6E+05	3.7E+03
Trichlorophenol,2,4,6-	88-06-2	1.7E+03	6.0E+00
Vanadium	7440-62-2	1.4E+05	2.6E+02
Vinyl chloride	75-01-4	7.9E+00	2.0E-01
Xylene(mixed)	1330-20-7	1.2E+04	1.0E+03
Zinc	7440-66-6	1.0E+06	1.1E+04

Table 1 Soil and Groundwater Standards			
Compound	CAS #	$Soil_{NHEM}$ (mg/kg)	GW_{NHEM} (mg/l)
Aliphatics C6-C8	NA	1.0E+04	3.2E+04
Aliphatics >C8-C10	NA	1.0E+04	1.3E+03
Aliphatics >C10-C12	NA	1.0E+04	1.4E+03
Aliphatics >C12-C16	NA	1.0E+04	1.4E+03
Aliphatics >C16-C35	NA	1.0E+04	7.3E+04
Aromatics >C8-C10	NA	1.0E+04	3.4E+02
Aromatics >C10-C12	NA	1.0E+04	3.4E+02
Aromatics >C12-C16	NA	1.0E+04	3.4E+02
Aromatics >C16-C21	NA	1.0E+04	1.1E+03
Aromatics >C21-C35	NA	1.0E+04	1.1E+03
TPH-GRO (C6-C10)	NA	1.0E+04	3.4E+02
TPH-DRO (C10-C28)	NA	1.0E+04	3.4E+02
TPH-ORO (>C28)	NA	1.0E+04	1.1E+03

AUTHORITY NOTE: Promulgated in accordance with R.S. 30:2180 et seq. and, in particular, 2186(A)(2).

HISTORICAL NOTE: Promulgated by the Office of the Secretary, Legal Affairs Division, LR 33:**.

§199. Appendix A—Equations for the Development of Soil and Groundwater Standards

$Soil_{NHEM}$—Carcinogenic Effects—Organic Constituents (mg/kg):

(EQ1)

$$\frac{TR \times BW_a \times AT_c \times 365 days/yr}{EF_i \times ED_i \times \left[\left(SF_o \times 10^{-6} \frac{kg}{mg} \times IRS_i\right) + \left(SF_i \times IRA_a \times \left(\frac{1}{VF_i}\right)\right) + \left(SF_o \times SA_i \times AF_i \times ABS \times 10^{-6} \frac{kg}{mg}\right)\right]}$$

Parameter	Definition (units)	Input Value
$Soil_{NHEM}$	NHEM industrial risk-based chemical concentration in soil/ sediment (mg/kg)	--
TR	Target excess individual lifetime cancer risk (unitless)	10^{-5}
SF_o	Oral cancer slope factor $((mg/kg\text{-}day)^{-1})$	CS[a]
SF_i	Inhalation cancer slope factor $((mg/kg\text{-}day)^{-1})$	CS[a]
BW_a	Average adult body weight (kg)	70[b]
AT_c	Averaging time - carcinogens (yr)	70[b]

Parameter	Definition (units)	Input Value
EF_i	Industrial exposure frequency (days/yr)	250[b]
ED_i	Industrial exposure duration (yr)	25[b]
IRS_i	Industrial soil ingestion rate (mg/day)	50[b]
IRA_a	Adult inhalation rate (m^3/day)	20[c]
VF_i	Industrial soil-to-air volatilization factor (m^3/kg)	CS[d]
SA_i	Skin surface area for an industrial worker (cm^2/day)	3,300[c]
AF_i	Soil-to-skin adherence factor for an industrial worker (mg/cm^2)	0.2[c]
ABS	Dermal absorption factor (unitless)	CS[c]

[a] Chemical-specific; refer to EPA's Integrated Risk Information System (http://www.epa.gov/iris/subst/index.html) or other appropriate EPA reference.

[b] *Soil Screening Guidance: User's Guide*, EPA 1996.

[c] *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*, EPA/540/R-99/005.

[d] Chemical-specific; refer to EQ5.

[e] Chemical-specific; refer to Table A-1.

$Soil_{NHEM}$—Carcinogenic Effects—Inorganic Constituents (mg/kg):

(EQ2)

$$\frac{TR x BW_a x AT_c x 365 days/yr}{EF_i x ED_i x \left[\left(SF_o x 10^{-6} \frac{kg}{mg} x IRS_i\right) + \left(SF_o x SA_i x AF_i x ABS x 10^{-6} \frac{kg}{mg}\right)\right]}$$

Parameter	Definition (units)	Input Value
$Soil_{NHEM}$	NHEM industrial risk-based chemical concentration in soil/ sediment (mg/kg)	--
TR	Target excess individual lifetime cancer risk (unitless)	10^{-5}
SF_o	Oral cancer slope factor ($(mg/kg\text{-}day)^{-1}$)	CS[b]
BW_a	Average adult body weight (kg)	70[b]
AT_c	Averaging time - carcinogens (yr)	70[b]
EF_i	Industrial exposure frequency (days/yr)	250[b]
ED_i	Industrial exposure duration (yr)	25[b]
IRS_i	Industrial soil ingestion rate (mg/day)	50[b]

Parameter	Definition (units)	Input Value
SA_i	Skin surface area for an industrial worker (cm^2/day)	3,300[c]
AF_i	Soil-to-skin adherence factor for an industrial worker (mg/cm^2)	0.2[c]
ABS	Dermal absorption factor (unitless)	CS[d]

[a] Chemical-specific; refer to EPA's Integrated Risk Information System (http://www.epa.gov/iris/subst/index.html) or other appropriate EPA reference.

[b] *Soil Screening Guidance: User's Guide*, EPA 1996.

[c] *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*, EPA/540/R-99/005.

[d] Chemical-specific; refer to EQ5.

[e] Chemical-specific; refer to Table A-1.

$Soil_{NHEM}$—Noncarcinogenic Effects—Organic Constituents (mg/kg):

(EQ3)

$$\frac{THQ \times BW_a \times AT_{ni} \times 365 days/yr}{ED_i \times EF_i \times \left[\left(\left(\frac{1}{RfD_o}\right) \times 10^{-6} \frac{kg}{mg} \times IRS_i\right) + \left(\left(\frac{1}{RfD_i}\right) \times IRA_a \times \left(\frac{1}{VF_i}\right)\right) + \left(\left(\frac{1}{RfD_o}\right) \times 10^{-6} \frac{kg}{mg} \times SA_i \times AF_i \times ABS\right)\right]}$$

Parameter	Definition (units)	Input Value
$Soil_{NHEM}$	NHEM industrial risk-based chemical concentration in soil/ sediment (mg/kg)	--
THQ	Target hazard quotient (unitless)	10
RfD_o	Oral reference dose (mg/kg-day)	CS[a]
RfD_i	Inhalation reference dose (mg/kg-day)	CS[a]
BW_a	Average adult body weight (kg)	70[b]
AT_{ni}	Averaging time - noncarcinogens, industrial (yr)	25[b]
EF_i	Industrial exposure frequency (days/yr)	250[b]
ED_i	Industrial exposure duration (yr)	25[b]
IRS_i	Industrial soil ingestion rate (mg/day)	50[b]
IRA_a	Adult inhalation rate (m^3/day)	20[c]
VF_i	Industrial soil-to-air volatilization factor (m^3/kg)	CS[d]
SA_i	Skin surface area for an industrial worker (cm^2/day)	3,300[c]
AF_i	Soil-to-skin adherence factor for an	0.2[c]

Parameter	Definition (units)	Input Value
	industrial worker (mg/cm^2)	
ABS	Dermal absorption factor (unitless)	CS[c]

[a] Chemical-specific; refer to EPA's Integrated Risk Information System (http://www.epa.gov/iris/subst/index.html) or other appropriate EPA reference.

[b] *Soil Screening Guidance: User's Guide*, EPA 1996.

[c] *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*, EPA/540/R-99/005.

[d] Chemical-specific; refer to EQ5.

[e] Chemical-specific; refer to Table A-1.

$Soil_{NHEM}$—Noncarcinogenic Effects—Inorganic Constituents (mg/kg):

(EQ4)

$$\frac{THQxBW_a xAT_{ni} x365days/yr}{ED_i xEF_i x\left[\left(\left(\frac{1}{RfD_o}\right)x10^{-6}\ \frac{kg}{mg}xIRS_i\right)+\left(\left(\frac{1}{RfD_o}\right)x10^{-6}\ \frac{kg}{mg}xSA_i xAF_i xABS\right)\right]}$$

Parameter	Definition (units)	Input Value
$Soil_{NHEM}$	NHEM industrial risk-based chemical concentration in soil/ sediment (mg/kg)	--
THQ	Target hazard quotient (unitless)	10
RfD_o	Oral reference dose (mg/kg-day)	CS[a]
BW_a	Average adult body weight (kg)	70[b]
AT_{ni}	Averaging time - noncarcinogens, industrial (yr)	70[b]
EF_i	Industrial exposure frequency (days/yr)	250[b]
ED_i	Industrial exposure duration (yr)	25[b]
IRS_i	Industrial soil ingestion rate (mg/day)	50[b]
SA_i	Skin surface area for an industrial worker (cm^2/day)	3,300[c]
AF_i	Soil-to-skin adherence factor for an industrial worker (mg/cm^2)	0.2[c]
ABS	Dermal absorption factor (unitless)	CS[d]

[a] Chemical-specific; refer to EPA's Integrated Risk Information System (http://www.epa.gov/iris/subst/index.html) or other appropriate EPA reference.

[b] *Soil Screening Guidance: User's Guide*, EPA 1996.

[c] *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*, EPA/540/R-99/005.

[d] Chemical-specific; refer to EQ5.

[e] Chemical-specific; refer to Table A-1.

VF_i—Volatilization Factor—Organic Constituents (m^3/kg):

(EQ5)

$$\frac{(Q/C)x(3.14xD_AxT)^{1/2}x10^{-4}(m^2/cm^2)}{(2x\rho_b xD_A)}$$

where:

(EQ6)

$$D_A(cm^2/s) = \frac{[(\theta_a{}^{10/3}xD_ixH'+\theta_w{}^{10/3}xD_w)/n^2]}{\rho_b xK_d + \theta_w + \theta_a xH'}$$

Parameter	Definition (units)	Input Value
VF_i	Industrial soil-to-air volatilization factor (m^3/kg)	--
D_A	Apparent diffusivity (cm^2/s)	--
Q/C	Inverse of the mean concentration at the center of source (g/m^2-s per kg/m^3)	79.25
T	Exposure interval – industrial (s)	7.9E+08[a]
ρ_b	Dry soil bulk density (g/cm^3)	1.7[b]
θ_a	Air-filled soil porosity (L_{air}/L_{soil})	$n-\theta_w$
n	Total soil porosity (L_{pore}/L_{soil})	$1 - (\rho_b/\rho_s)$
θ_w	Water-filled soil porosity (L_{water}/L_{soil})	0.21[b]
ρ_s	Soil particle density (g/cm^3)	2.65[b]
D_i	Diffusivity in air (cm^2/s)	CS[c]
H'	Henry's Law Constant (dimensionless)	CS[c,d]
D_w	Diffusivity in water (cm^2/s)	CS[c]
K_d	Soil-water partition coefficient (cm^3/g) = K_{oc} x f_{oc}	CS[c]
K_{oc}	Soil organic carbon partition coefficient (cm^3/g)	CS[c]
f_{oc}	Fractional organic carbon in soil (g/g) = percent organic matter/174 (ASTM 2974)	0.006[b]

[a] *Soil Screening Guidance: User's Guide*, EPA 1996.

[b] LDEQ default value.

[c] Chemical-specific.

[d] H' = H x 41 where: H = Henry's Law Constant (atm-m^3/mol); R = Universal Law Constant (0.0000821 atm-m^3/mole-^oK); and T = Absolute temperature of soil (^oK) [273 + ^oC (25 ^oC)].

Table A-1
Dermal Absorption Factors [1]

Constituent	ABS (unitless)
Arsenic	0.03
Cadmium	0.001
Chlordane	0.04
2,4-D	0.05
DDT	0.03
Gamma-hexachlorocyclohexane	0.04
TCDD	0.03
Pentachlorophenol	0.25
Polychlorinated biphenyls	0.14
Polycyclic aromatic hydrocarbons	0.13
Other semivolatile organic constituents	0.10
Other inorganic constituents (metals)	0
Volatile constituents	0

[1] *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Interim Guidance*. EPA 2004. EPA/540/R-99/005.

GW_{NHEM}—Carcinogenic Effects—Volatile Constituents (mg/l):

(EQ7)

$$\frac{TR x AT_c x 365 days/yr}{EF_{ni} x[(SF_i x K_w x IRA_{adj})+(SF_o x IRW_{adj})]} x DF$$

Parameter	Definition (units)	Input Value
GW_{NHEM}	NHEM chemical concentration in groundwater (mg/l)	--
TR	Target excess individual lifetime cancer risk (unitless)	10^{-5}
SF_o	Oral cancer slope factor ($(mg/kg-day)^{-1}$)	CS[a]
SF_i	Inhalation cancer slope factor ($(mg/kg-day)^{-1}$)	CS[a]
AT_c	Averaging time - carcinogens (yr)	70[b]
EF_{ni}	Industrial exposure frequency (days/yr)	350[b]
IRW_{adj}	Age-adjusted water ingestion rate (L-yr/kg-day)	1.1[b]
IRA_{adj}	Age-adjusted inhalation rate (m^3-yr/kg-	11[b]

Parameter	Definition (units)	Input Value
	day)	
K_w	Water-to-indoor air volatilization factor (L/m^3)	0.5[c,d]
DF	Dilution and Attenuation Factor (unitless)	100[c]

[a] Chemical-specific: refer to EPA's Integrated Risk Information System (http://www.epa.gov/iris/subst/index.html) or other appropriate EPA reference.

[b] Human Health Medium-Specific Screening Levels, EPA Region VI, 2003.

[c] *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remedial Goals)*, EPA 1991.

[d] The water-air concentration relationship represented by the volatilization factor (K_w) is applicable only to chemicals with a Henry's Law Constant of greater than 1E-05 atm-m^3/mole and a molecular weight of less than 200 g/mole.

GW_{NHEM}—Noncarcinogenic Effects—Volatile Constituents (mg/l):

(EQ8)

$$\frac{THQxBW_a\,xAT_{nni}\,x365days/yr}{EF_{ni}\,xED_{ni}\,x\left[\left(\frac{1}{RfD_i}xK_w\,xIRA_a\right)+\left(\frac{1}{RfD_o}xIRW_a\right)\right]}xDF$$

Parameter	Definition (units)	Input Value
GW_{NHEM}	NHEM chemical concentration in groundwater (mg/l)	--
THQ	Target hazard quotient (unitless)	10
RfD_i	Inhalation reference dose (mg/kg-day)	CS[a]
RfD_o	Oral reference dose (mg/kg-day)	CS[a]
BW_a	Average adult body weight (kg)	70[b]
AT_{nni}	Averaging time - noncarcinogens, non-industrial (yr)	30[b]
EF_{ni}	Non-industrial exposure frequency (days/yr)	350[b]
ED_{ni}	Industrial exposure duration (yr)	30[b]
IRW_a	Adult water ingestion rate (L/day)	20[b]
IRA_a	Adult inhalation rate (m^3/day)	20[b]
K_w	Water-to-indoor air volatilization factor (L/m^3)	0.5[c,d]
DF	Dilution Factor (unitless)	100

[a] Chemical-specific: refer to EPA's Integrated Risk Information System (http://www.epa.gov/iris/subst/index.html) or other appropriate EPA reference.

[b] Human Health Medium-Specific Screening Levels, EPA Region VI, 2003.

[c] *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remedial Goals)*, EPA 1991.

[d] The water-air concentration relationship represented by the volatilization factor (K_w) is applicable only to chemicals with a Henry's Law Constant of greater than 1E-05 atm-m^3/mole and a molecular weight of less than 200 g/mole.

GW_{NHEM}—Carcinogenic Effects—Non-Volatile Constituents (mg/l):

(EQ9)

$$\frac{TR x AT_c x 365 days/yr}{EF_{ni} x (SF_o x IRW_{adj})} x DF$$

Parameter	Definition (units)	Input Value
GW_{NHEM}	NHEM chemical concentration in groundwater (mg/l)	--
TR	Target excess individual lifetime cancer risk (unitless)	10^{-5} [a]
SF_o	Oral cancer slope factor ($(mg/kg\text{-}day)^{-1}$)	CS [b]
AT_c	Averaging time - carcinogens (yr)	70 [a]
EF_{ni}	Non-industrial exposure frequency (days/yr)	350 [a]
IRW_{adj}	Age-adjusted water ingestion rate (L-yr/kg-day)	1.1 [a]
DF	Dilution Factor (unitless)	100

[a] Chemical-specific; refer to EPA's Integrated Risk Information System (http://www.epa.gov/iris/subst/index.html) or other appropriate EPA reference.

[b] Human Health Medium-Specific Screening Levels, EPA Region VI, 2003.

GW_{NHEM}—Noncarcinogenic Effects—Non-Volatile Constituents (mg/l):

(EQ10)

$$\frac{THQ x BW_a x AT_{nni} x 365 days/yr}{EF_{ni} x ED_{ni} x (1/RfD_o x IRW_a)} x DF$$

Parameter	Definition (units)	Input Value
GW_{NHEM}	NHEM chemical concentration in groundwater (mg/l)	--
THQ	Target hazard quotient (unitless)	10
RfD_o	Oral reference dose (mg/kg-day)	CS[a]
BW_a	Average adult body weight (kg)	70[b]
AT_{nni}	Averaging time - noncarcinogens, non-industrial (yr)	30[b]
EF_{ni}	Non-industrial exposure frequency (days/yr)	350[b]
ED_{ni}	Non-industrial exposure duration (yr)	30[b]
IRW_a	Adult water ingestion rate (L/day)	2[b]
DF	Dilution Factor (unitless)	100

[a] Chemical-specific; refer to EPA's Integrated Risk Information System (http://www.epa.gov/iris/subst/index.html) or other appropriate EPA reference.

[b] Human Health Medium-Specific Screening Levels, EPA Region VI, 2003.

AUTHORITY NOTE: Promulgated in accordance with R.S. 30:2180 et seq. and, in particular, 2186(A)(2).

HISTORICAL NOTE: Promulgated by the Office of the Secretary, Legal Affairs Division, LR 33: **.

Chapter 51. Fee Schedules

§5147. Fee for NHEM Determination for Contaminated Environmental Media

A. A fee of $3,000 shall be submitted at the time a request for a review of contaminated environmental media for a NHEM determination is made in accordance with LAC 33:V.106.

AUTHORITY NOTE: Promulgated in accordance with R.S. 30:2180 et seq. and, in particular, 2186(A)(2).

HISTORICAL NOTE: Promulgated by the Office of the Secretary, Legal Affairs Division, LR 33:**.